In the Drawings

[c1] (Presently Amended, Once) A method for obtaining nuclear magnetic resonance measurements ~~in a wellbore~~, comprising:

inducing a static magnetic field in a fluid sample~~, the static magnetic field being primarily inhomogeneous in the fluid sample~~;

applying an oscillating magnetic field to the fluid sample according to a preparation pulse sequence that comprises a J-edit pulse sequence for developing J modulation; and

acquiring the nuclear magnetic resonance measurements using a detection sequence, wherein the detection sequence comprises at least one 180-degree pulse.

[c2] (Original) The method of claim 1, wherein the J modulation is based on a heteronuclear coupling.

[c3] (Original) The method of claim 2, wherein the heteromuclear coupling is carbon-proton coupling.

[c4] (Original) The method of claim 3, wherein the J-edit pulse sequence includes a variable delay and the applying and the acquiring are performed a plurality of times to provide a plurality of nuclear magnetic resonance measurements each with a different value for the variable delay.

[c5] (Original) The method of claim 4, further comprising analyzing amplitudes of the plurality of nuclear magnetic resonance measurements as a function of the variable delay to provide J coupling information or relative abundance of carbon groups.

[c6] (Original) The method of claim 5, wherein the analyzing comprises solving a set of linear equations or performing a Fourier transformation.

[c7] (Original) The method of claim 5, further comprising determining types of hydrocarbons present in the fluid sample.

[c8] (Original) The method of claim 4, further comprising analyzing amplitudes of the plurality of nuclear magnetic resonance measurements to derive a composition of the fluid sample,

wherein the analyzing is performed using a basis set of measurements obtained with standard samples having known compositions.

[c9] (Original) The method of claim 4, further comprising deriving a J-modulation curve describing amplitudes of the plurality of nuclear magnetic resonance measurements as a function of the variable delay; and comparing the J-modulation curve with a basis set of standard J-modulation curves to derive a composition of the fluid sample, wherein the basis set of the standard J-modulation curves are obtained with standard samples having known compositions.

[c10] (Original) The method of claim 1, wherein the fluid sample is located in an earth formation.

[c11] (Original) The method of claim 1, wherein the fluid sample is removed from an earth formation by a formation tester.

[c12] (Original) The method of claim 4, wherein the nuclear magnetic resonance measurements comprise proton signals.

[c13] (Original) The method of claim 4, wherein the nuclear magnetic resonance measurements comprise carbon signals.

[c14] (Original) The method of claim 1, wherein the preparation pulse sequence further comprises a signal enhancement pulse sequence.

[c15] (Original) The method of claim 14, wherein the signal enhancement pulse sequence is a nuclear Overhauser enhancement pulse sequence or a magnetization transfer pulse sequence.

[c16] (Original) The method of claim 1, wherein the J-edit pulse sequence includes a gated-decoupling pulse.

[c17] (Presently Amended, Once) A method for characterizing formation fluids, comprising:
disposing a nuclear magnetic resonance instrument in a borehole;

inducing a static magnetic field in a fluid sample in a region of interest, the static magnetic field being primarily inhomogeneous in the fluid sample;

applying an oscillating magnetic field to the fluid sample according to a preparation pulse sequence that comprises a J-edit pulse sequence for developing J modulation; and

acquiring nuclear magnetic resonance measurements using a detection sequence, wherein the detection sequence comprises at least one 180-degree pulse.

[c18] (Original) The method of claim 17, wherein the region of interest is in an earth formation.

[c19] (Original) The method of claim 17, wherein the region of interest is inside the nuclear magnetic resonance instrument.

[c20] (Original) The method of claim 17, wherein the J-edit pulse sequence includes a variable delay and the applying and the acquiring are performed a plurality of times to provide a plurality of nuclear magnetic resonance measurements each with a different value for the variable delay.

[c21] (Original) The method of claim 20, further comprising analyzing amplitudes of the plurality of nuclear magnetic resonance measurements as a function of the variable delay to provide J coupling information or relative abundance of carbon groups.

[c22] (Original) The method of claim 21, further comprising determining hydrocarbon types in the fluid sample.

[c23] (Original) The method of claim 20, further comprising analyzing amplitudes of the plurality of nuclear magnetic resonance measurements to derive a composition of the fluid sample, wherein the analyzing is performed using a basis set of measurements obtained with standard samples having known compositions.

[c24] (Original) The method of claim 20, further comprising deriving a J-modulation curve describing amplitudes of the plurality of nuclear magnetic resonance measurements as a function of the variable delay; and comparing the J-modulation curve with a basis set of standard J-modulation curves to derive a composition of the fluid sample, wherein the

basis set of the standard J-modulation curves are obtained with standard samples having known compositions.

[c25] (Presently Amended, Once) A method for determining with a downhole tool an oil-to-water ratio in a fluid sample, comprising:

obtaining a nuclear magnetic resonance data set representing protons attached to carbon-13 in the fluid sample;

deriving a hydrocarbon content from the nuclear magnetic resonance data set, taking into account a natural abundance of carbon-13;

acquiring a total nuclear magnetic resonance for all protons in the fluid sample, wherein the fluid sample is subject to a primarily inhomogeneous static magnetic field;

deriving a total hydrogen index from the total nuclear magnetic resonance measurement; and

deriving the oil-to-water ratio of the fluid sample from the hydrocarbon content and the total hydrogen index.

[c26] (Original) The method of claim 25, wherein the nuclear magnetic resonance data set is obtained by subtracting a first proton nuclear magnetic resonance measurement acquired with a J-edit pulse sequence from a second proton nuclear magnetic resonance measurement acquired without a J-edit pulse sequence.

[c27] (Presently Amended, Once) A nuclear magneticresonance instrument, comprising:

a housing adapted to move in a wellbore;

a magnet disposed in the housing adapted to induce a static magnetic field in a zone of interest, the static magnetic field being primarily inhomogeneous in the zone of interest;

an antenna assembly disposed in the housing, the antenna assembly adapted to induce an oscillating magnetic field in the zone of interest and to receive nuclear magnetic resonance signals; and

an electronic module including a memory to store instructions for performing a J-edit pulse sequence.

[c28] (Original) The instrument of claim 27, wherein the housing is adapted to be lowered into the wellbore on an electric cable.

[c29] (Original) The instrument of claim 27, wherein the housing forms part of a drilling tool assembly.

[c30] (Original) The instrument of claim 27, wherein the housing forms part of a formation fluid sampling tool.